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# U.S. Geological Survey Proposal

## F: Air Quality Near Deer Trail, Colorado

### Option 1: Bulk deposition study

#### Questions:

What is the composition of the particulates blown by the wind off the biosolids-applied fields near Deer Trail? Are these particulates different than those blown by the wind off non-biosolids farmed fields in the vicinity?

#### Concerns:

Dark particulates have been observed by the public in the air, especially southeast of the biosolids-application fields, since biosolids applications to this property began (around 1994).

#### Objectives:

To determine the characteristics of particulates transported by wind from biosolids-applied fields near Deer Trail.

To compare the mass, particle size, and chemical composition of particulates collected from a biosolids-applied field with those from a control field (no biosolids applied), and possibly with those from untilled rangeland (grazing land).

#### Approach:

During the first year of the study, two farmed fields will be selected, one that receives biosolids applications by the Metro Wastewater Reclamation District and one that does not. Sites will be selected such that soil associations and types, slope, aspect, and field condition are as similar as possible. The control site (no biosolids applied) will be generally upwind from the biosolids-applied site, and far enough away from the biosolids-applied site that effects from the biosolids-applied site will be minimal. During the second year of the study, a third field might be added to the study to represent bulk deposition from untilled rangeland for a similar soil. Collection containers will be installed above the ground surface at the selected sites. Samples will be collected only during the windiest seasonal period (or shortly thereafter) during two consecutive years beginning in 2006. Samples will be collected during the windiest seasonal period to attempt to capture the maximum particulate transport. All samples will be collected according to USGS protocols.

If sufficient sample material can be collected, the samples will be analyzed using the same methods and laboratory used to analyze the soil samples to maximize comparability with soil data from the USGS studies near Deer Trail. In that case, samples will be dried at

the USGS laboratory in Denver, then analyzed for ICP-MS trace elements by the USGS. Additional analyses may be done if sample amount is sufficient.

Resulting data for the control site and possibly the rangeland site will be compared with resulting data for the biosolids-applied site with respect to mass, particle size, and chemical composition of the particles collected.

#### Monitoring sites:

The sites will be located in areas having similar soil type, slope, aspect, land use, and proximity to farmed fields and dirt roads, but far enough apart to avoid biosolids effects on the control site and rangeland site. The biosolids-applied site will be located on the interior of the Metro Wastewater Reclamation District's South property because stakeholder input has indicated that particulates from this area often are transported by wind. The biosolids-applied site will be located on or adjacent to (down wind of) a farmed field that has received biosolids at least once and could receive biosolids again, and surrounded by fields in the vicinity that have received biosolids at least once and could receive biosolids again. The control site will be located on or adjacent to (down wind of) a farmed field that has never received biosolids and will not receive biosolids during the years of this study. If a rangeland site is added to the study, this site will be located on or adjacent to (down wind of) an unfarmed, grazed field that has never received biosolids and will not receive biosolids during the years of this study. Stakeholder input will be used to select appropriate sites and to determine the windiest seasonal period when particulates are likely to move from wind transport.

#### Benefits:

This approach will yield information about the mass, particle size, and chemical composition of wind-transported particulates from farmland that does and does not have biosolids applied.

The collection of these samples also may provide information about other characteristics of these particles that could be useful in differentiating the particles from biosolids-applied fields.

#### Limitations:

This approach may not yield sufficient sample material for useful analysis. In that case, the approach will be changed. A longer time will need to pass between sample collections, or samples from the same site collected at different times will be combined prior to analysis.

The difference between the results for the control site and the biosolids-applied site may not be large enough to be detected.

Although the sites will be selected to be as similar as possible except for biosolids applications, natural characteristics and farming practices of the sites will differ.

Differences in mass, particle size, and chemical composition in samples from the different sites could be caused by differences in farming practices and field size, localized differences in wind patterns, or even differences in soil at the different sites and have nothing to do with biosolids applications.

This approach will not provide any direct information about health risks from biosolids applications. This approach will provide no information about pathogens (bacteria and viruses).

#### Schedule of implementation:

This study option is planned to take place seasonally during two years. The study option is planned to start near the beginning of 2006 and conclude in 2007.